

Serial No. 10/614,206
Reply to Office Action Mailed: June 14, 2005
Attorney Docket No. 056203.50977C1

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A high pressure fuel pump for an internal combustion engine having a cylinder, a plunger slidably fitted in the cylinder and a seal mechanism for blocking fuel leakage from an end of a sliding portion between said cylinder and said plunger and also for preventing an lubricant for a driving mechanism of said plunger from entering into said cylinder from said end of the sliding portion of said cylinder and said plunger, wherein:

a holder surrounding said end of the sliding portion of said cylinder and said plunger is provided;

said seal mechanism comprises two mutually independent seal devices mounted with a specific spacing in a longitudinal direction from said end of the sliding portion of said cylinder and said plunger along a circumference of said plunger; and

the two seal devices are held on the circumference of said plunger by said holder surrounding said end of the sliding portion of said cylinder and said plunger while keeping said specific spacing; and

a fuel reservoir is formed between said end of the sliding portion and one of said seal devices mounted on a side of said end of the sliding portion, said fuel reservoir being in fluid communication with a suction chamber of said pump within said pump.

2. (withdrawn) A high pressure fuel pump according to claim 1, further comprising a spacer for regulating said specific spacing mounted between said two seal devices.

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3. (original) A high pressure fuel pump according to claim 1, wherein the seal device on said cylinder side, of said two seal devices, has a fuel seal function, and the remaining seal device has a lubricant seal function.

4. (currently amended) A high pressure fuel pump for an internal combustion engine having a cylinder, a plunger slidably fitted in the cylinder, a seal mechanism for blocking fuel leakage from an end of the sliding portion of said cylinder and plunger and also preventing a lubricant for a driving mechanism of said plunger from entering into said cylinder from said end of the sliding portion of said cylinder and said plunger, and a holder having a screw portion for threadedly engaging with a pump body, said cylinder being mounted in said holder and being fixed to the pump body by threadedly engaging the holder with the pump body, wherein:

said holder has a cover portion for surrounding said sliding portion of the cylinder and plunger;

said seal mechanism comprises two mutually independent seal devices mounted with a specific spacing in a longitudinal direction from said end of the sliding portion of said cylinder and said plunger along a circumference of said plunger; and

the two seal devices are held on the circumference of said plunger by the cover portion of said holder while keeping the specific spacing; and

a fuel reservoir is formed between said end of the sliding portion and one of said seal devices mounted on a side of said end of the sliding portion, said fuel reservoir being in fluid communication with a suction chamber of said pump within said pump.

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5. (withdrawn) A high pressure fuel pump according to claim 4, further comprising a spacer for regulating said specific spacing mounted between said two seal devices.

6. (original) A high pressure fuel pump according to claim 4, wherein the seal device on said cylinder side, of said two seal devices, has a fuel seal function, and the remaining seal device has a lubricant seal function.

7. (withdrawn) A high pressure fuel pump for an internal combustion engine comprising a plunger for force-feeding fuel in a pressurization chamber, a suction valve provided at an inlet of the pressurization chamber, a discharge valve provided at an exit of the pressurization chamber, a low pressure chamber provided on an upstream side of the suction valve, a cylinder for slidably holding said plunger, and a seal structures for rendering an outer circumference of said plunger sealed fluid-tight located at two locations at an outside of said cylinder and in an axial direction of said plunger,

wherein an annular member made of a resin is used in the seal structure located on said pressurization chamber side, of said seal structures at two locations.

8. (withdrawn) A high pressure fuel pump according to claim 7, wherein the seal structure on the opposite side to the pressurization chamber, of said seal structures at two locations, is a rubber annular structure.

9. (withdrawn) A high pressure fuel pump for an internal combustion engine comprising a plunger for force-feeding the fuel in a pressurization chamber, a suction valve provided at an inlet of the pressurization chamber, a discharge valve provided at an exit of the pressurization chamber, a low pressure

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chamber provided on an upstream side of the suction valve, a cylinder for slidably holding said plunger, and seal structures for rendering an outer circumference of said plunger sealed fluid-tight located at two locations at an outside of said cylinder and in an axial direction of the plunger,

wherein there is provided in the cylinder a transverse hole by which the fuel leaked from the pressurization chamber to a fuel reservoir formed on a pressurization chamber side of the seal structures through a clearance between said cylinder and said plunger is returned to an inlet port.

10. (currently amended) A high pressure fuel pump for an internal combustion engine having a cylinder, a plunger slidably fitted in the cylinder and a seal mechanism for blocking fuel leakage from an end of a sliding portion between said cylinder and said plunger and also for preventing a lubricant oil for a driving mechanism of said plunger from entering into said cylinder from said end of the sliding portion of said cylinder and said plunger, wherein:

said seal mechanism comprises two seal portions mounted with a specific spacing in a longitudinal direction from said end of the sliding portion of said cylinder and said plunger along a circumference of said plunger; ~~and~~

a space in which the fuel and the lubricant coexist is provided between said two seal portions; and

a fuel reservoir is formed between said end of the sliding portion and one of said seal portions mounted on a side of said end of the sliding portion, said fuel reservoir being in fluid communication with a suction chamber of said pump within said pump.

11. (previously presented) A high pressure fuel pump according to claim 10, further comprising a spacer for regulating the spacing, mounted between said two seal portions.

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12. (previously presented) A high pressure fuel pump according to claim 10, wherein the seal portion on the cylinder side, of said two seal portions, has a fuel seal function, and the remaining seal portion has a lubricant seal function.

13. (withdrawn) A high pressure fuel pump according to claim 10, wherein said seal portion on said cylinder side, of said two seal portions, is structured by a resin annular member.

14. (withdrawn) A high pressure fuel pump according to claim 10, where the seal portion remote from said cylinder, of said two seal portions, is structured by a rubber annular member.

15. (currently amended) A high pressure fuel pump according to claim, 1, wherein there is provided in the cylinder a transverse hole by which the fuel leaked ~~from the pressurization chamber to a fuel reservoir formed on a pressurization chamber side of the seal structures through a clearance between said cylinder and said plunger~~ in the fuel reservoir is returned to an inlet port ~~the suction chamber of the said pump.~~

16. (currently amended) A high pressure fuel pump according to claim 4, wherein there is provided in the cylinder a transverse hole by which the fuel leaked ~~from the pressurization chamber to a fuel reservoir formed on a pressurization chamber side of the seal structures through a clearance between said cylinder and said plunger~~ in the fuel reservoir is returned to an inlet port ~~the suction chamber of the said pump.~~

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17. (currently amended) A high pressure fuel pump according to claim 10, wherein there is provided in the cylinder a transverse hole by which the fuel leaked ~~from the pressurization chamber to a fuel reservoir formed on a pressurization chamber side of the seal structures through a clearance between said cylinder and said plunger~~ in the fuel reservoir is returned to ~~an inlet port~~ the suction chamber of the said pump.

18. (withdrawn) A high pressure fuel pump according to claim 10, further comprising a spacer (344) provided along a circumference of said plunger in said space between said two seal portions.

19. (withdrawn) A high pressure fuel pump according to claim 2, wherein said spacer is made of aluminum.

20. (withdrawn) A high pressure fuel pump according to claim 5, wherein said spacer is made of aluminum.

21. (withdrawn) A high pressure fuel pump according to claim 18, wherein said spacer is made of aluminum

22. (withdrawn) A high pressure fuel pump according to claim 18, further comprising a holder (21) for holding said two seal portions and said spacer provided therebetween, and wherein said two seal portions and said spacer are held between said holder (21) and said plunger (2) by a seal holder (305).